MOTION CONTROLLED REMOTE CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
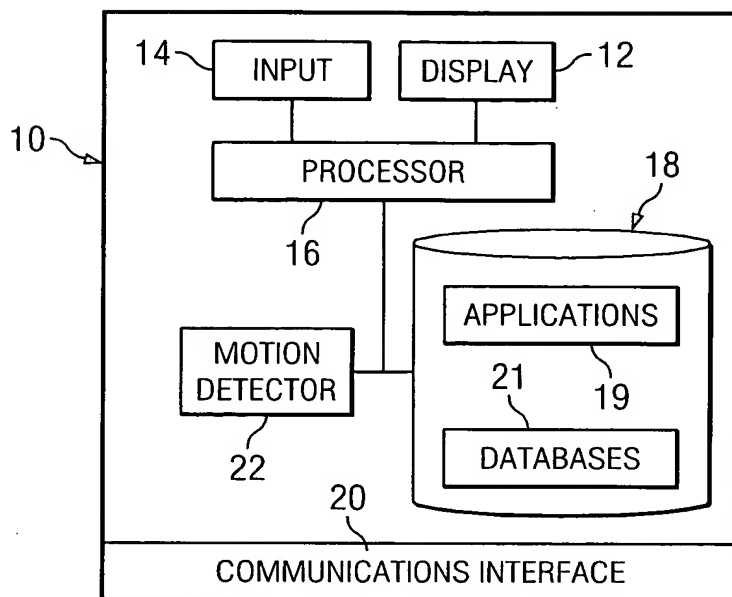Sheet 1 of 11

1/11

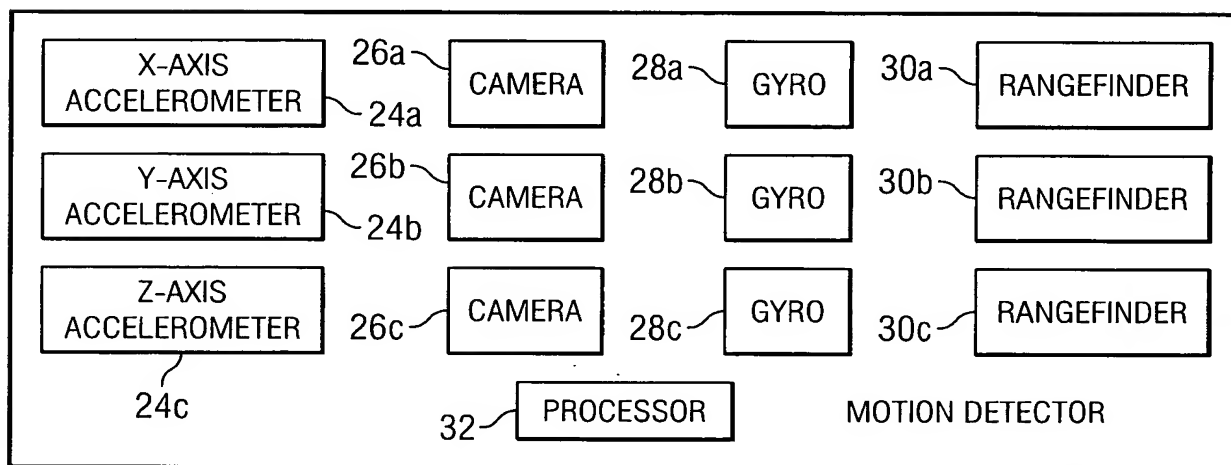INPUT 14
DISPLAY 12
10
PROCESSOR
16
18
MOTION DETECTOR
22
APPLICATIONS 19
21
DATABASES
20
COMMUNICATIONS INTERFACE

FIG. 1

X-AXIS ACCELEROMETER 26a   CAMERA 28a   GYRO 30a   RANGEFINDER
24a
Y-AXIS ACCELEROMETER 26b   CAMERA 28b   GYRO 30b   RANGEFINDER
24b
Z-AXIS ACCELEROMETER 26c   CAMERA 28c   GYRO 30c   RANGEFINDER
24c
32 PROCESSOR   MOTION DETECTOR
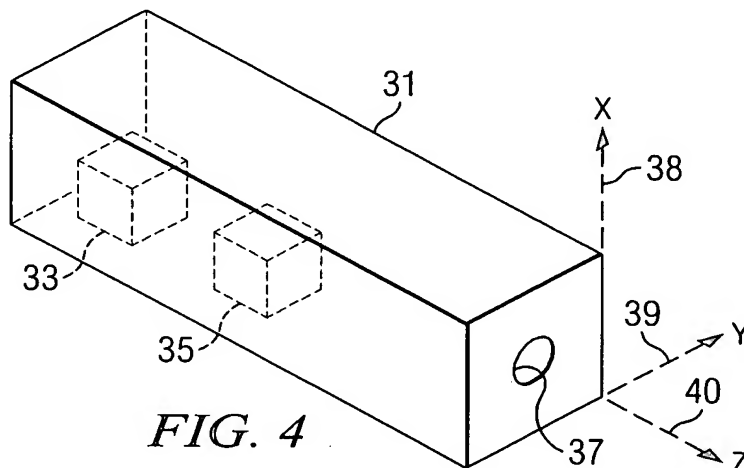22

FIG. 2

31
33
35
37
X 38
39
Y
40
Z

FIG. 4

MOTION CONTROLLED REMOTE
CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
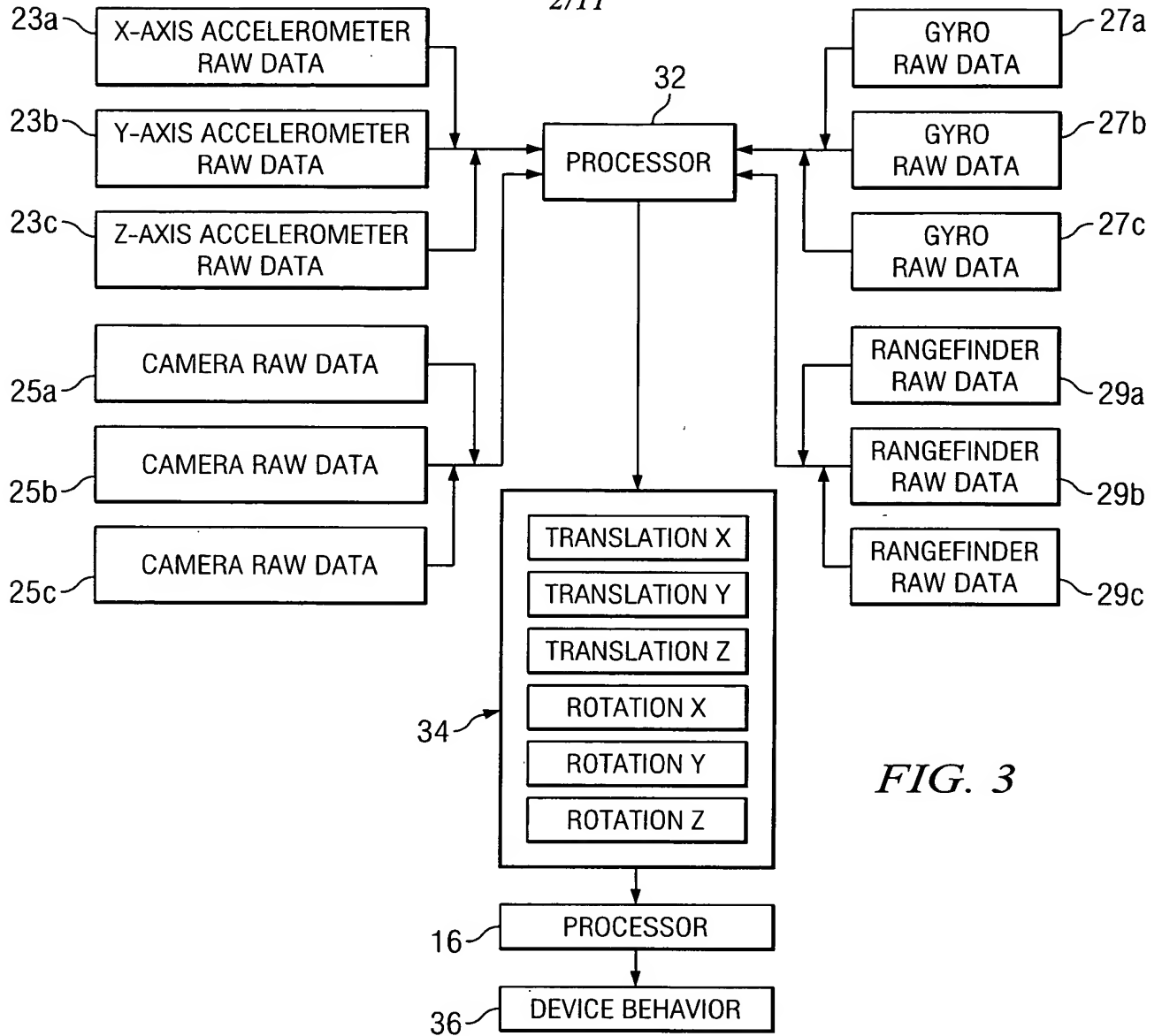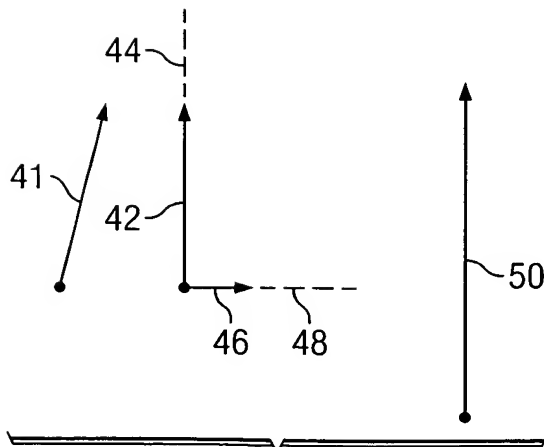Attorney's Docket: 073338.0190 (04-50462 FLA)
Sheet 2 of 11

2/11

23a — X-AXIS ACCELEROMETER RAW DATA

23b — Y-AXIS ACCELEROMETER RAW DATA

23c — Z-AXIS ACCELEROMETER RAW DATA

25a — CAMERA RAW DATA

25b — CAMERA RAW DATA

25c — CAMERA RAW DATA

27a — GYRO RAW DATA

27b — GYRO RAW DATA

27c — GYRO RAW DATA

29a — RANGEFINDER RAW DATA

29b — RANGEFINDER RAW DATA

29c — RANGEFINDER RAW DATA

32 — PROCESSOR

34 —
TRANSLATION X
TRANSLATION Y
TRANSLATION Z
ROTATION X
ROTATION Y
ROTATION Z

16 — PROCESSOR

36 — DEVICE BEHAVIOR

FIG. 3

44

41

42

46   48

50

FIG. 5

MOTION CONTROLLED REMOTE
CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
                            Sheet 3 of 11

3/11

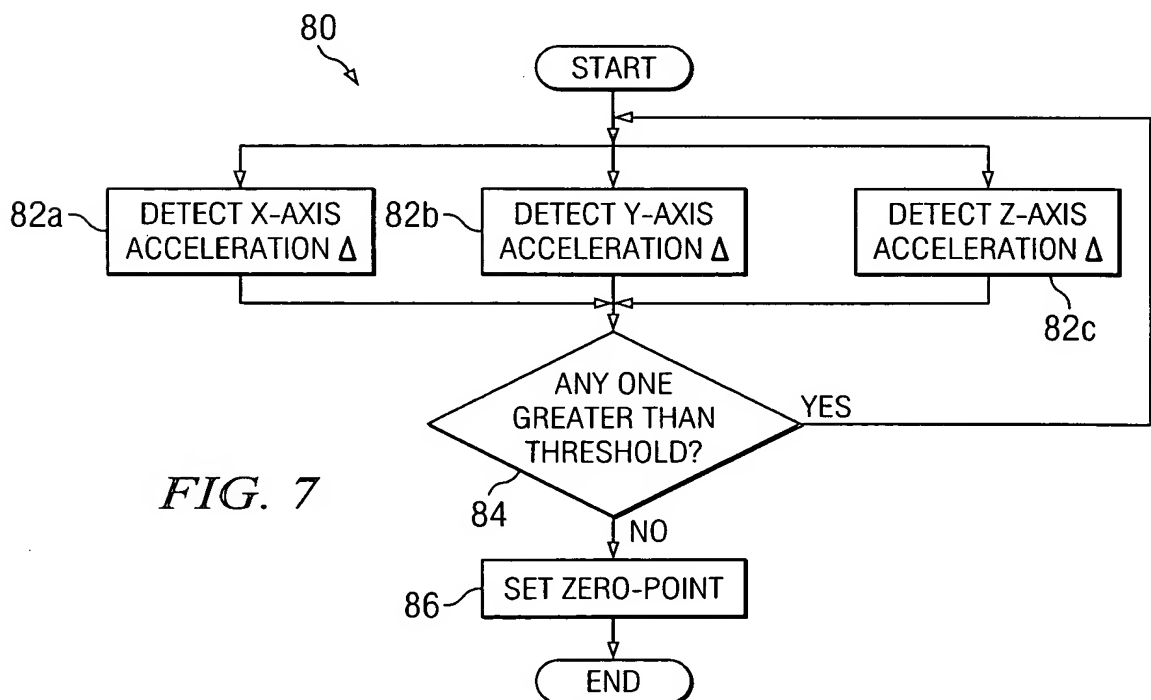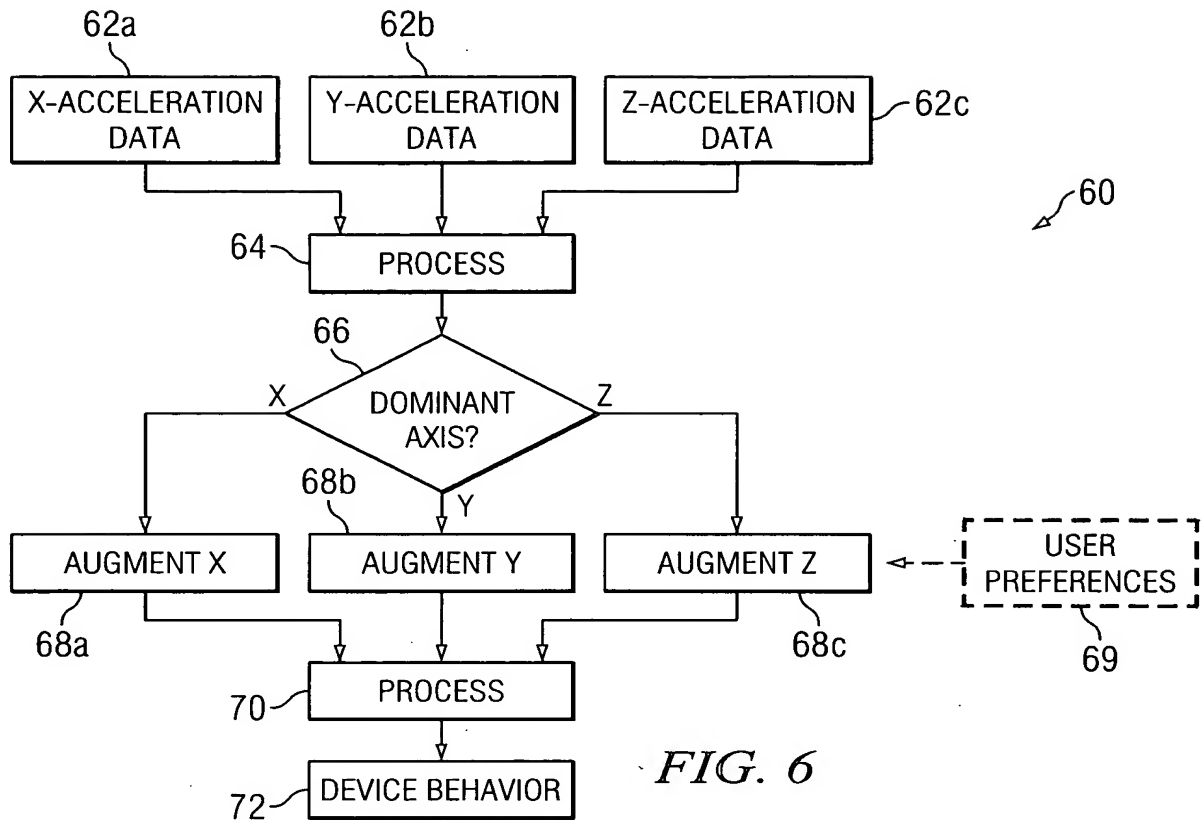*FIG. 6*

FIG. 7

MOTION CONTROLLED REMOTE
CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
Sheet 4 of 11

4/11
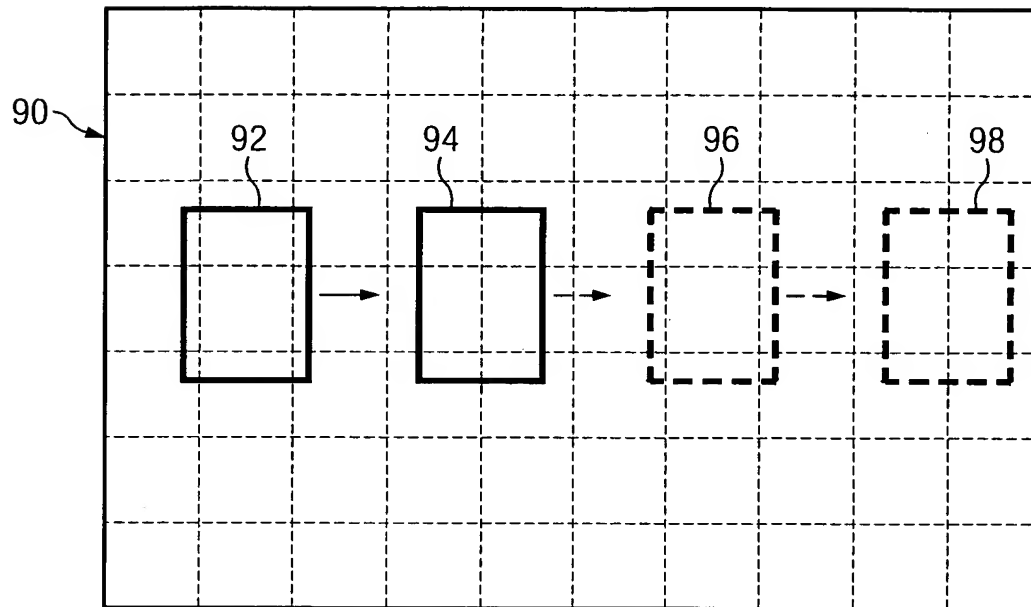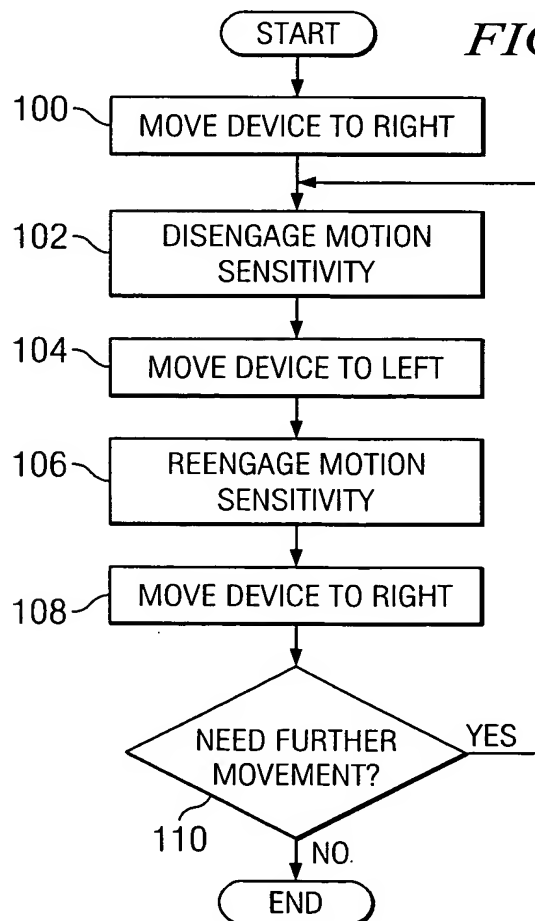
FIG. 8

FIG. 9

MOTION CONTROLLED REMOTE
CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
                                Sheet 5 of 11

5/11

120

FIG. 10A

133   135   136   137   138   OUT

UP   DOWN   LEFT   RIGHT   IN   139

FIG. 10B

142		140		144			146		
A	B	C	D	B1	B2	B3	B2a	B2b	B2c
E	F	G	H	B4	B5	B6	B2d	B2e	B2f
I	J	K	L	B7	B8	B9	B2g	B2h	B2i
M	N	O	P						

FIG. 11

MOTION CONTROLLED REMOTE
CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
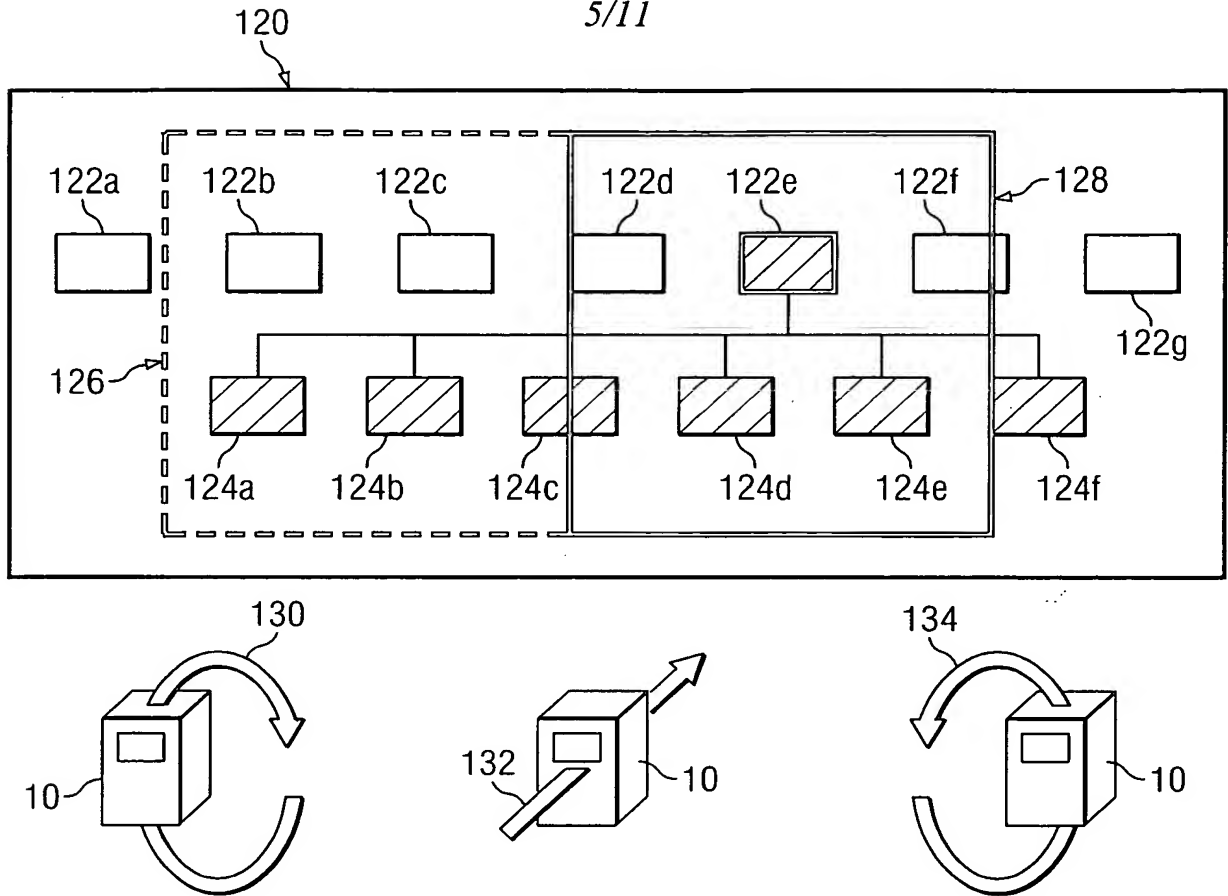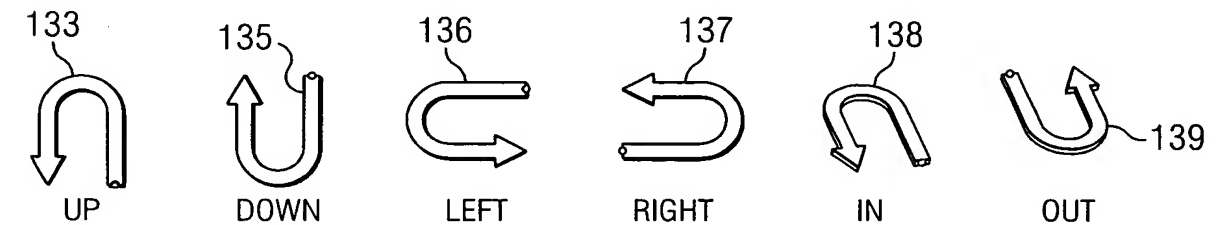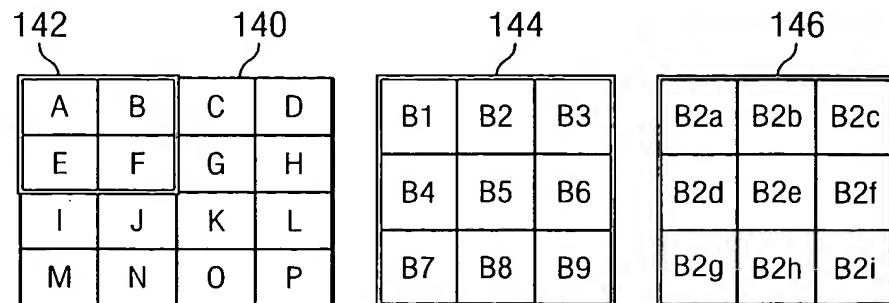Sheet 6 of 11

6/11

FIG. 12A

FIG. 12B

MOTION CONTROLLED REMOTE CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
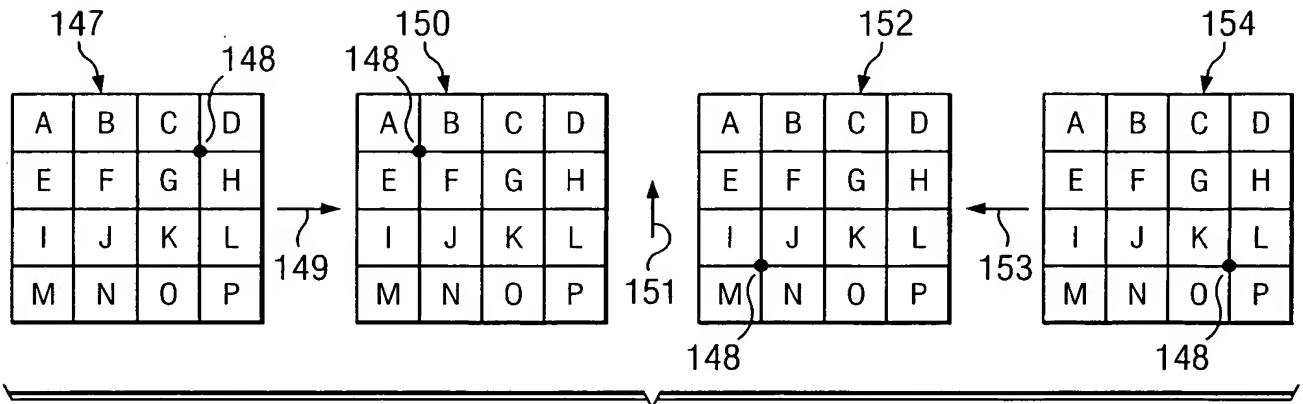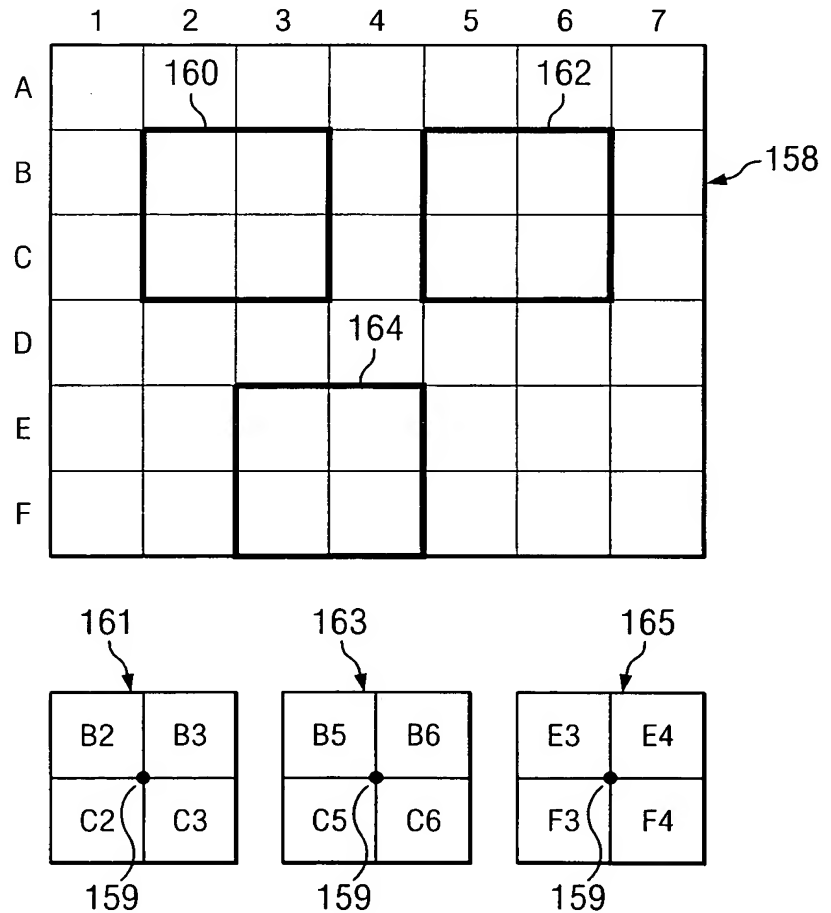   Sheet 7 of 11

7/11

172 — RECEIVE RAW MOTION DATA

170

174 — PROCESS

176 — CHECK DEVICE STATE

178 — ANALYZE MOTION DETECTOR OUTPUT

180 — MOTION MEANINGFUL/ RECOGNIZABLE GIVEN STATE? — NO

FIG. 13

YES

182 — PROVIDE FEEDBACK

184 — BEHAVE

186 — ABOVE THRESHOLD ? — NO

YES

188 — PROVIDE FEEDBACK

---

10 — HANDHELD DEVICE

200

206 — COMMUNICATION NETWORK

204 — AUTHENTICATOR

FIG. 14

202 — mCommerce APPLICATION

---

220 — 222

222 — HANDHELD DEVICE — 10

226 — COMMUNICATION NETWORK
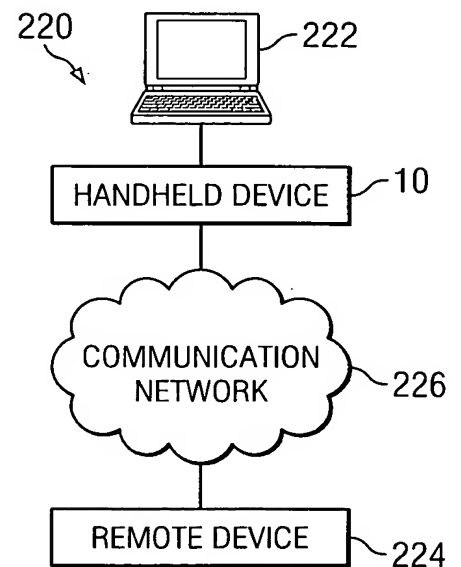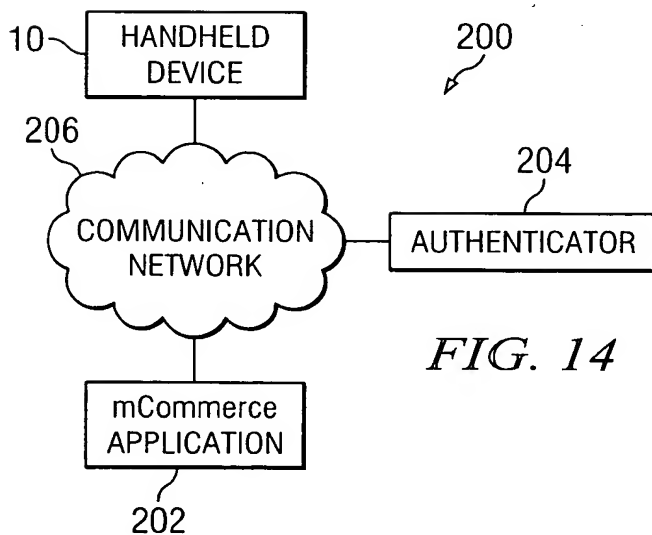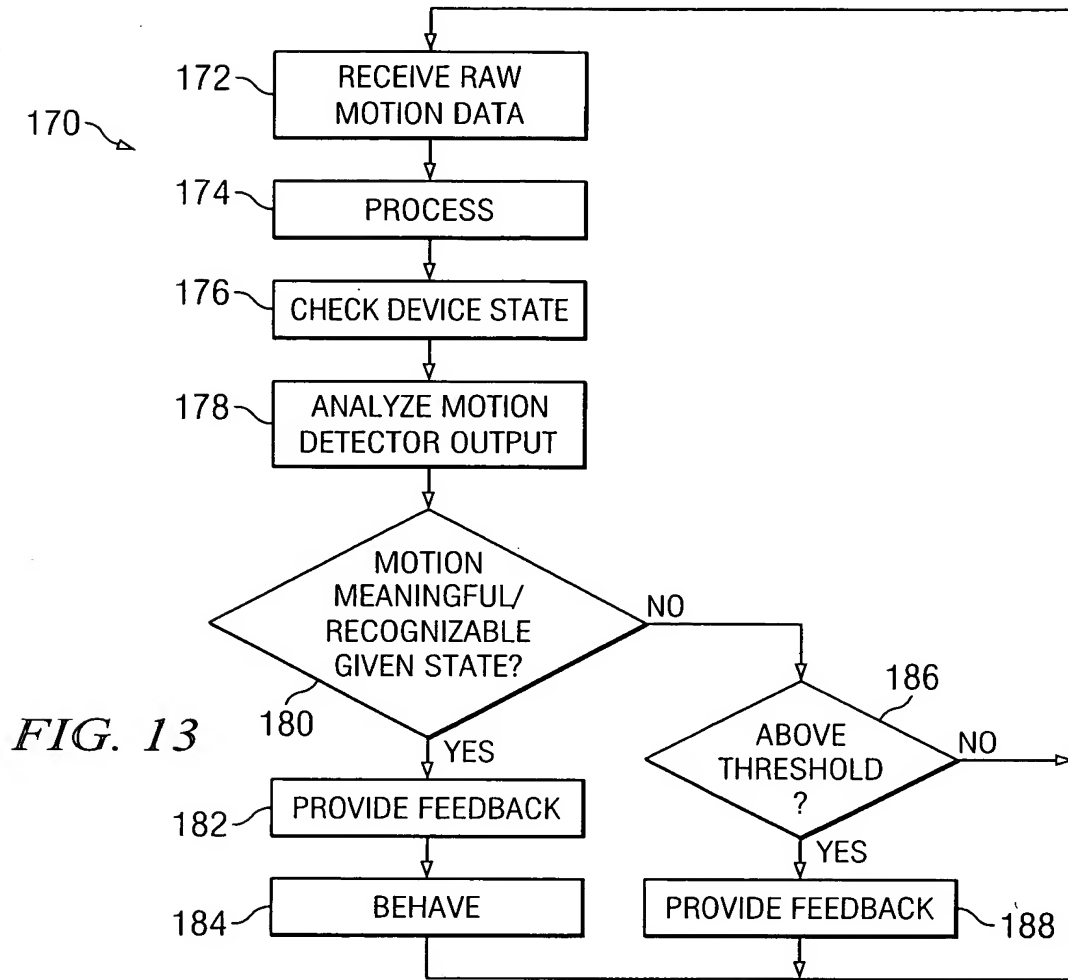
224 — REMOTE DEVICE

FIG. 15

MOTION CONTROLLED REMOTE CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
Sheet 8 of 11

8/11

232 — RECEIVE RAW MOTION DATA

230

234 — PROCESS

236

DETERMINE MOTION AND ORIENTATION

| ROTATING AROUND Z-AXIS | TRANSLATING ALONG X-AXIS | ORIENTED AT α, θ, ω | o o o | STILL |

237a 237b 237c 237n

DETERMINE ENVIRONMENT BASED ON MOTION AND ORIENTATION

| FACE DOWN ON TABLE | FALLING | ON TRAIN | o o o | HELD IN HAND |

239a 239b 239c 239n

238

MAP ENVIRONMENT TO BEHAVIOR

| ENGAGE MUTE | POWER DOWN CHIPS TO SURVIVE IMPACT | o o o | INCREASE MOTION ACTIVATION THRESHOLD |

241a 241b 241n
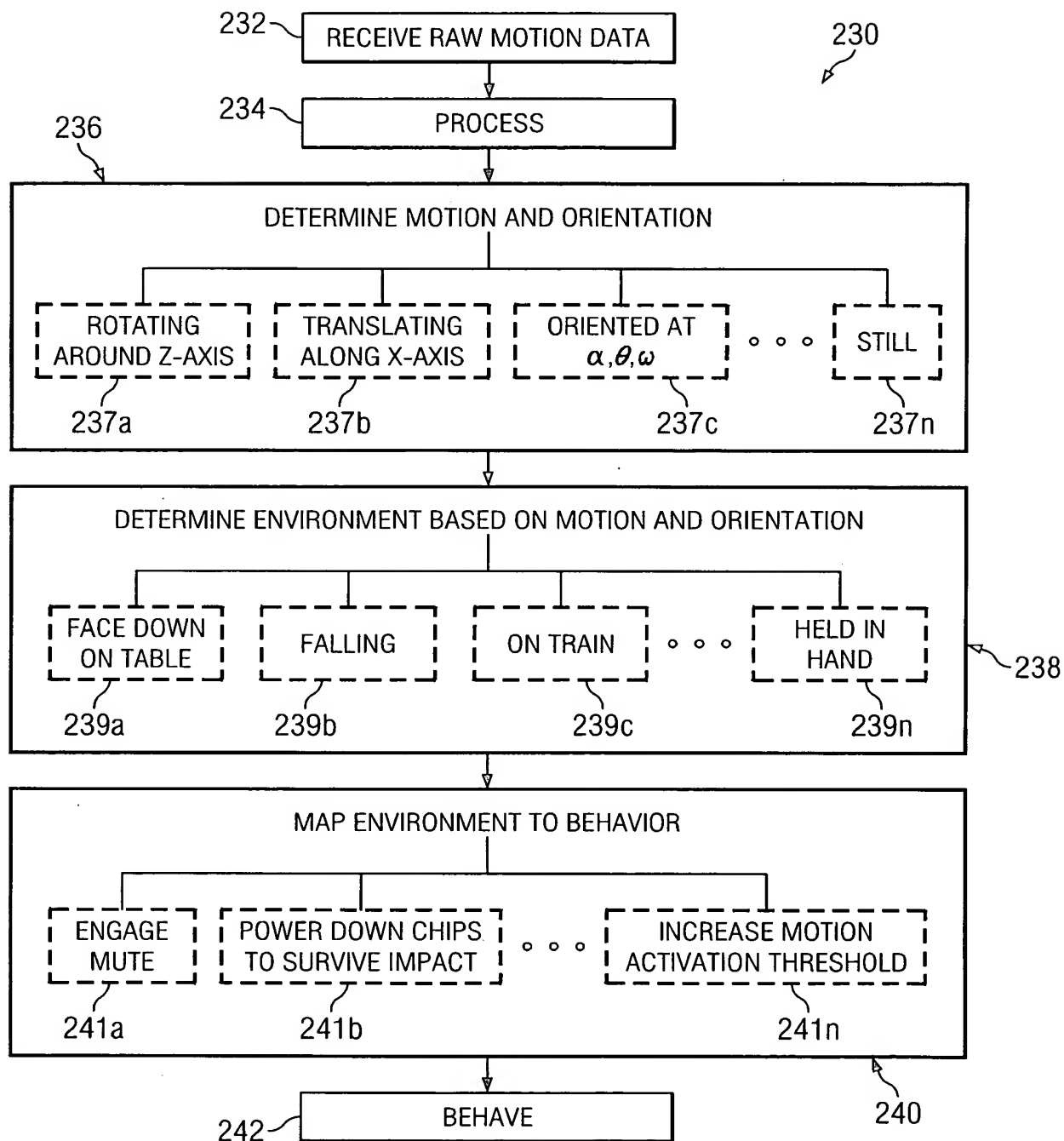
240

242 — BEHAVE

FIG. 16

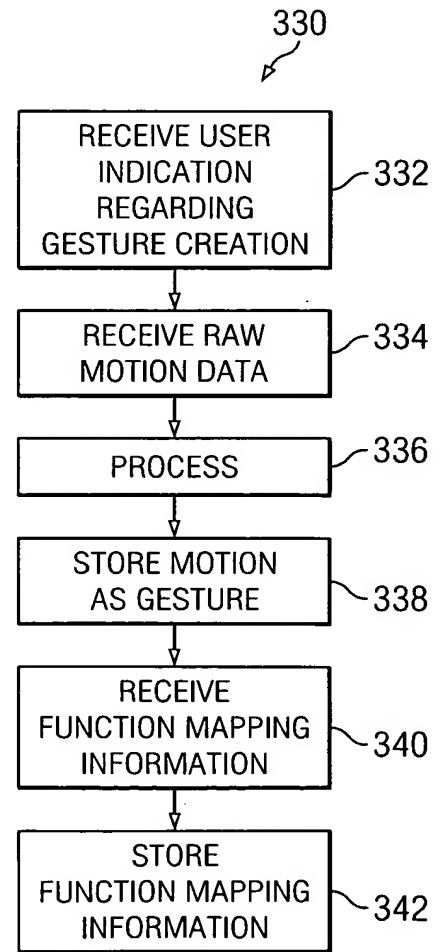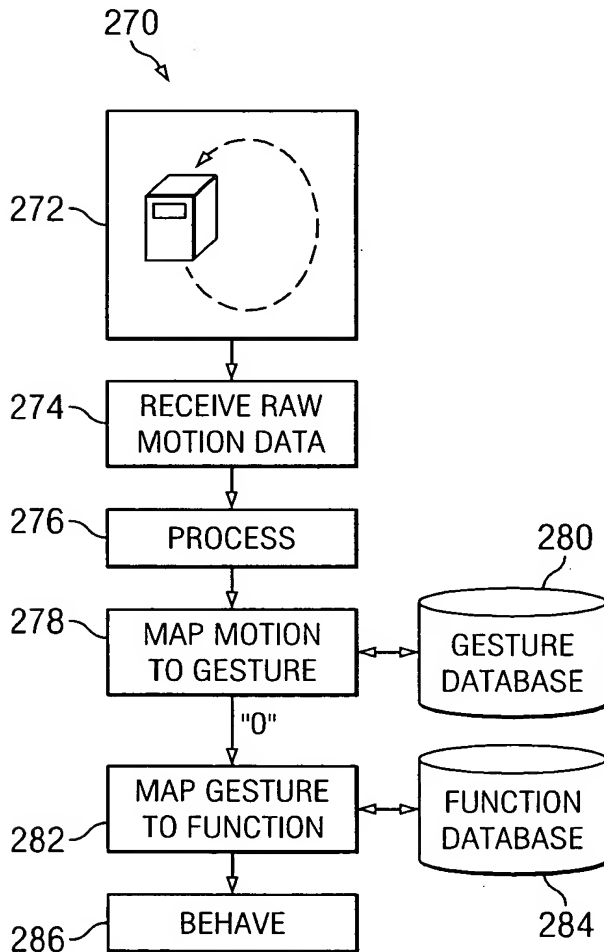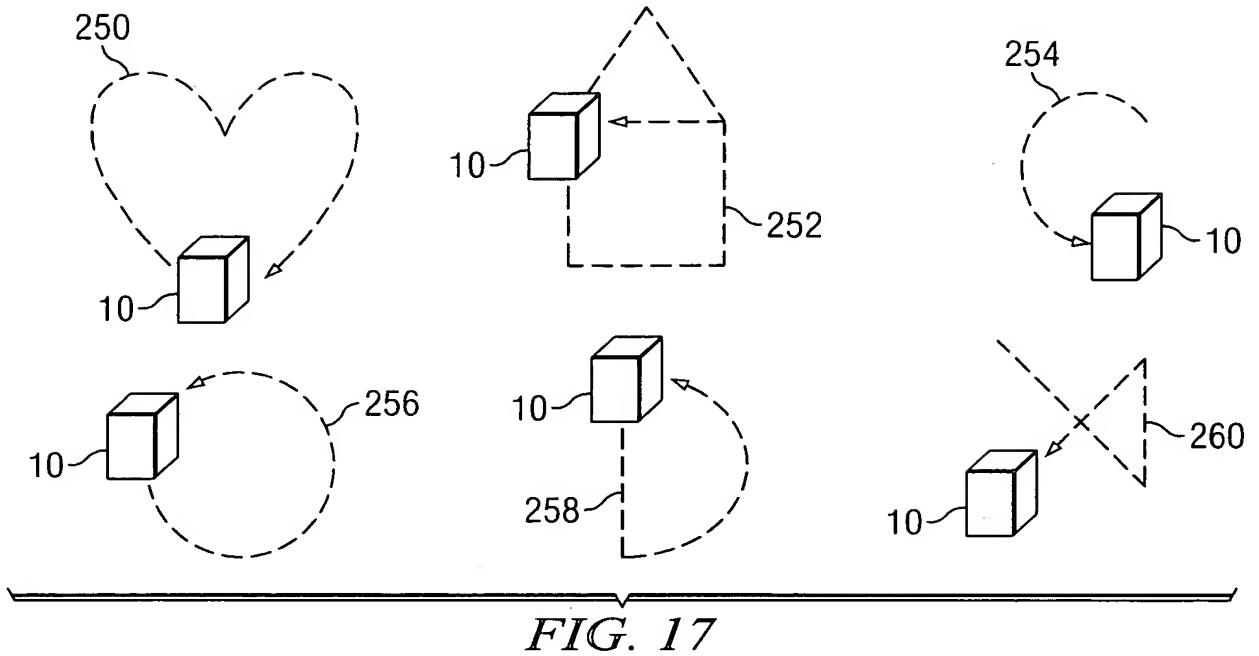MOTION CONTROLLED REMOTE
CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
                              Sheet 9 of 11
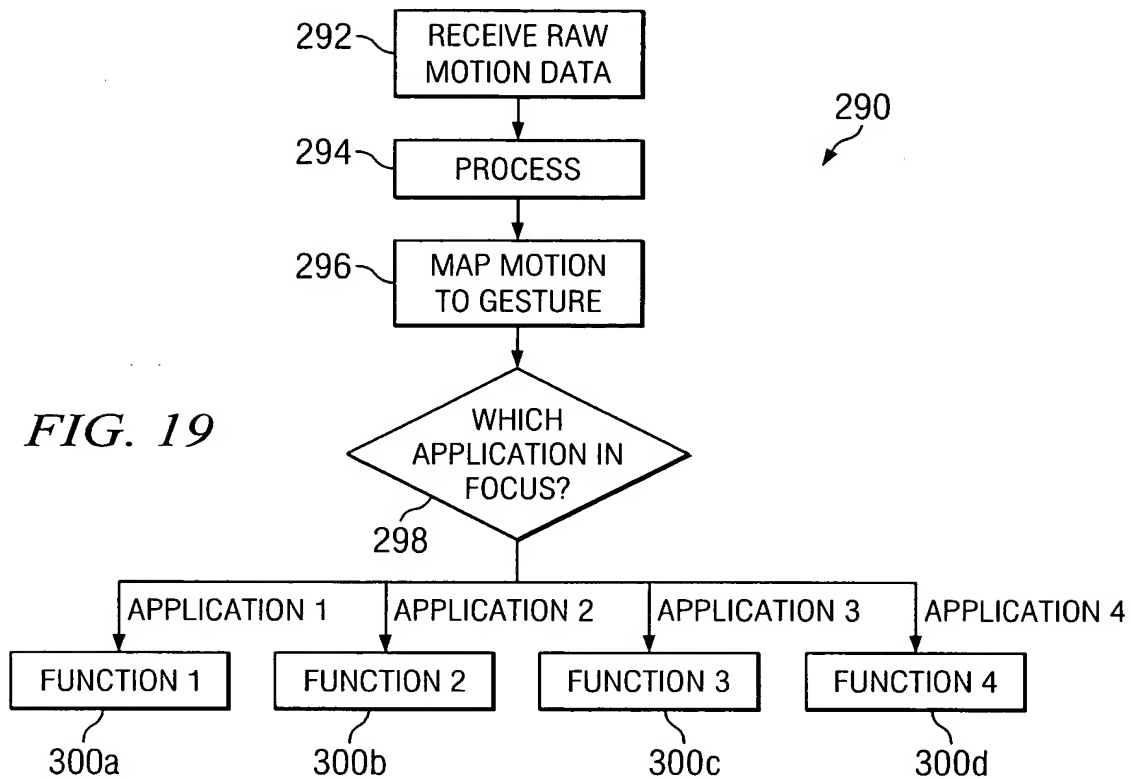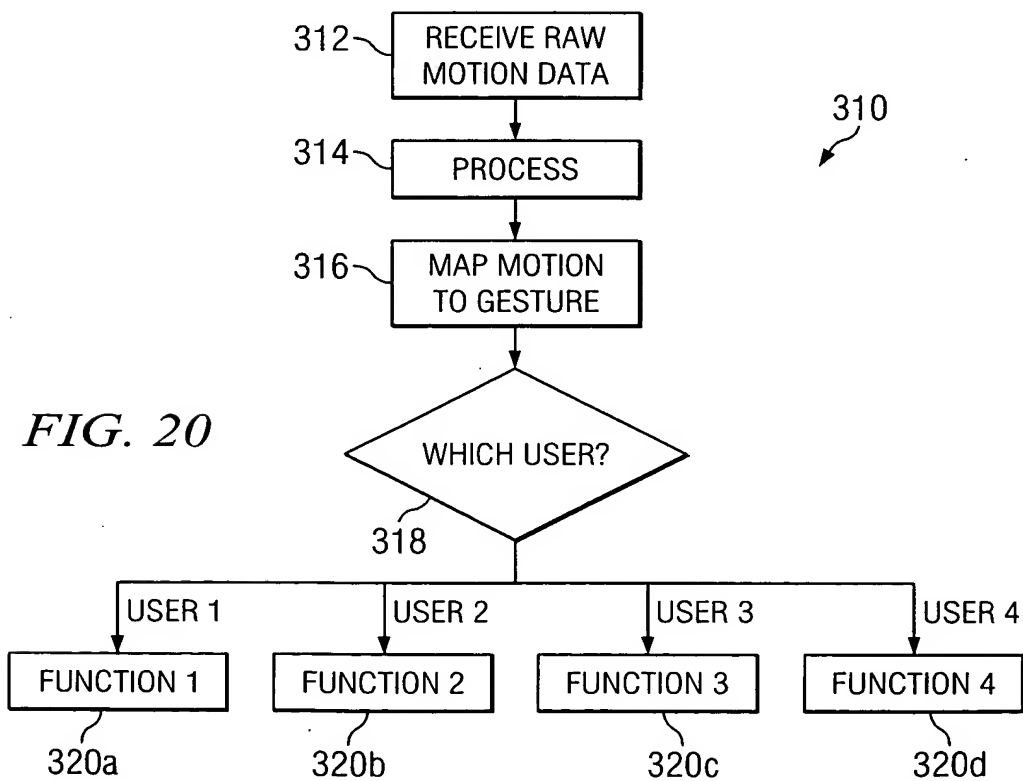
9/11

FIG. 17

FIG. 18

FIG. 21

MOTION CONTROLLED REMOTE CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
                                      Sheet 10 of 11

10/11

292 — RECEIVE RAW MOTION DATA

↓

294 — PROCESS

↓

296 — MAP MOTION TO GESTURE

↓

290

FIG. 19

WHICH APPLICATION IN FOCUS?

298

APPLICATION 1	APPLICATION 2	APPLICATION 3	APPLICATION 4
FUNCTION 1	FUNCTION 2	FUNCTION 3	FUNCTION 4
300a	300b	300c	300d

312 — RECEIVE RAW MOTION DATA

↓

314 — PROCESS

↓

316 — MAP MOTION TO GESTURE

↓

310

FIG. 20

WHICH USER?

318

USER 1	USER 2	USER 3	USER 4
FUNCTION 1	FUNCTION 2	FUNCTION 3	FUNCTION 4
320a	320b	320c	320d

MOTION CONTROLLED REMOTE
CONTROLLER
Inventors: David L. Marvit et al.
Date Filed: March 23, 2004
Attorney's Docket: 073338.0190 (04-50462 FLA)
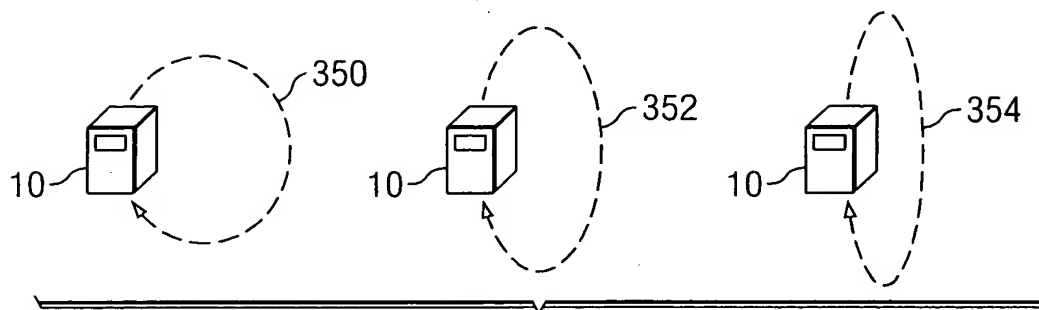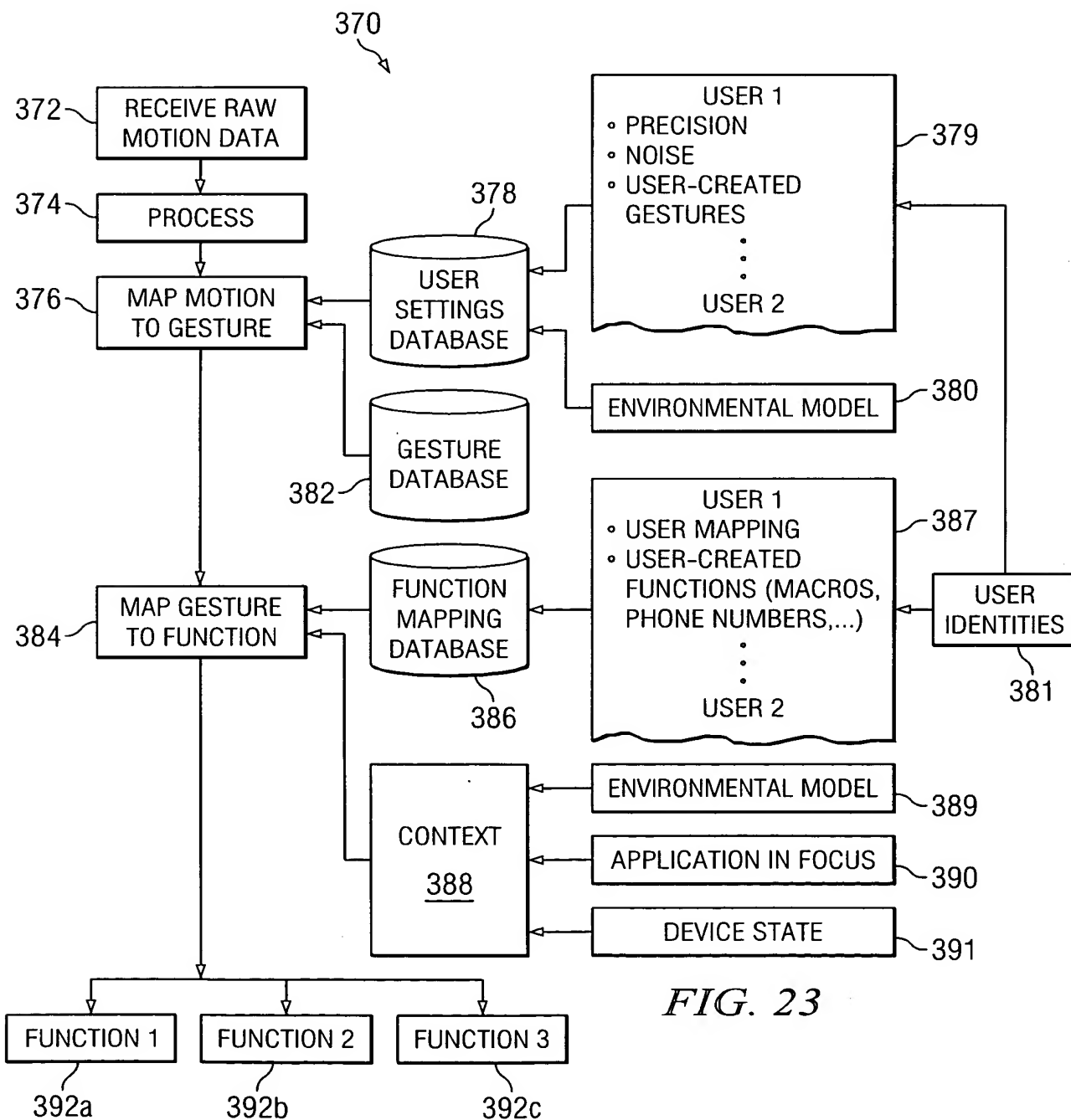   Sheet 11 of 11

11/11

FIG. 22

FIG. 23